

Tanta University	3 rd year, Computers & Control Dept.
Faculty of Engineering	Digital Signal Processing

Sheet 3

1. The impulse response of the relaxed LTI system is given as

$$h(n) = a^n u(n) \text{ and } |a| < 1$$

- Determine the response of this system if it is excited by unit step response
- Determine the overall response of the system

2. Two discrete time LTI systems are connected in cascade connection as shown. determine the unit sample response of this cascade connection



3. Determine the response of the system whose input $x(n)$ and unit sample response $h(n)$ are given as follows:

$$x(n) = \begin{cases} \frac{1}{3}n & \text{for } 0 \leq n \leq 6 \\ 0 & \text{otherwise} \end{cases}$$

$$h(n) = \begin{cases} 1 & \text{for } -2 \leq n \leq 2 \\ 0 & \text{otherwise} \end{cases}$$

- 4. Determine the output of the LTI system whose input and unit sample response are given as follows:**

$$x(n) = b^n u(n)$$

$$h(n) = a^n u(n)$$

- 5. Determine the response of the system whose input and unit sample response are given as follows:**

$$x(n) = u(n + 1) - u(n - 4) - \delta(n - 5)$$

$$x(n) = [u(n + 2) - u(n - 3)] \cdot (3 - |n|)$$